

Murray, although totally different from *angophora lanceolata*, or the Apple Tree of New South Wales.

ART. VII.—MR. W. BLANDOWSKI'S *Report, No. III. to the Surveyor-General, of an Excursion from King's Station to Bass River, Phillip and French Islands.*

Camp on Phillip Island, Western Port,
January 29th, 1855.

SIR,

IN my route along the southern coast, I have visited the following localities: namely, the whole coast of Western Port to Cape Paterson, Phillip, French, and Sandstone Islands.

The land from Dr. Adam's station toward Lisle's, consists for the most part of scrubby and swampy plains, but if drained would be admirably adapted for agricultural purposes. At present, however, it is dry only during the hot months of January and February. Between Lisle's station and the inlets, the land is swampy, and luxuriantly covered with excellent grass, well adapted for fattening cattle.

The inlets are in a very bad state for travelling, the banks being extremely boggy.

The ferryman stationed there does little or nothing towards any improvements, and the boats are in so leaky a state as to become half full before reaching the opposite shore. It would be only doing justice to the travelling population of these parts, and also a great boon to those who intend investing their labour at the coal mines of Cape Paterson, to make some improvement in the means of transit across these inlets. Moreover, as many people lose their way in this short distance, (being scarcely three miles,) and several persons are even supposed to have perished in the scrub and swamps, it is imperative that a track be marked out to prevent such calamities in future. The same remark applies also to the whole roads between Lisle's station and Bass River. It was between these two places that Dr. Mueller missed his way in the beginning of last year, and was exposed to much privation; and Mr. Black, a settler of long standing in these parts, also lost himself in the same locality, being reduced to such extreme distress as to be under the necessity of sacrificing his horse to maintain his own existence. For the formation

of a distinguishable track, only a few marked trees at intervals in the forest, and about a dozen poles with straw heads erected on the plain, would be requisite, as this would amply suffice to guide a traveller unacquainted with these districts.

Expenses could be avoided by simply requiring the inhabitants of these parts to cause a track such as this to be formed.

Between Lisle's and Cuthbert's stations the country consists of magnificent pasture grounds, the horse having to walk through thick kangaroo grass, reaching up to the girths.

I observed between these two places a forest of young gum saplings excellently adapted for building purposes, and for telegraph posts, &c.; and as a new source of industry, favoured by the facility of approach by sea, is deserving of the consideration of the Melbourne population. Straight saplings of any size up to 100 feet, can be plentifully obtained; and I may say, that I have never, during my travels, happened to meet with so fine a forest of these young trees.

On Settlement Point the land is good for agricultural purposes, but the scarcity of water acts as a drawback to the advancement of this locality.

The mouth of the Bass River is well adapted for the formation and future advancement of a settlement; but the banks are at present very thinly wooded. Abundance of fresh water, and the fact that vessels of upwards of 150 tons burthen are frequently anchored at the mouth of the river, are recommendations much stronger than those which induced the formation of a township at Settlement Point; and I may here add, that the occupation of obtaining salt by evaporation is at this locality already extensively carried on, offering to small capitalists a very profitable investment. If the coal fields near Cape Paterson were proved to be workable, the Bass River would at once become the central point of a great mining district, and particularly if connected by a good road with the former locality.

Phillip Island, owing to its position, and to its having an excellent soil and abundance of good water, has also the advantage of being surrounded by a magnificent harbour (any portion of which can be traversed in the numerous channels, about five fathoms in depth, which intersect the mud banks). It is of considerable extent, covering an area of about sixty square miles; and it appears to me that this island possesses all the capabilities for becoming a most thriving part of this country.

The sandy soil between Balcombe's, Calin's, Baxter's, and Mrs. King's stations, and Mordialloc, at once drew my attention to the subject of the coal formation. This soil, which is of great extent, is covered with heath and low fern, and its nature appears to be a somewhat unusual occurrence throughout Victoria.

The compact masses of slate of a dirty greyish brown colour found near King's station, form an excellent material for building purposes, and demand a more careful examination for fossil remains; but as such an investigation would not be in strict accordance with my present mission, I did not feel myself justified in applying labour and time for so speculative an object.

Two circumstances attracted my special observation:—

1st. Springs of excellent water are abundant throughout the whole of this district; and,

2ndly. I could not detect any shells or fragments of such, imbedded in the soil.

The first fact proves that clay or slate, and not basalt, must form the basis of this soil: the second demonstrates that the sand arises from the decomposition of sandstone, and is not the result of any marine deposit, for in the former case brackish water or marine shells would be easily detected when looked for, and seashore plants would still be found flourishing on the rich soil.

The large deposits of bluish clay in the extensive plains near the Great Swamp, as also the sandy soil, and petrified wood scattered on the surface between Lisle's and Cuthbert's stations: the thin layers of fossil vegetable matters imbedded in the same slate as that occurring at King's station, as well as the recurrence of fossil wood at French Island precisely similar to that just mentioned,—all lead inevitably to the opinion that the micaceous slaty sandstone which surrounds Sandstone Island in so many circular layers, belongs to the coal formation. And, my belief in this is still further strengthened by the fact, that I have found on the north side of Phillip Island positive evidence of the coal formation, the strata being about 400 and 500 feet in thickness, and about three-quarters of a mile in breadth. How far they extend inland, I cannot with any degree of probability assume, as they are covered with alluvial sand, and I have not labour at my command to enter into an investigation relative to their extension. Nevertheless, at a hasty glance, I should imagine that these strata compose the upper part of the coal forma-

tion of French Island, and probably stand in some submarine connection with it.

The coal formation of this locality (Phillip Island) consists of cliffs of coarse sandstone, precisely similar to that which I have observed in different coal districts on the continent of Europe, and is about 100 or 120 feet in thickness. In the centre of this sandstone, three thin layers of slate first drew my attention to the probability of its belonging to the coal formation, and I accordingly at once entered upon a search for fossil plants, in which object I have succeeded to my entire satisfaction. Subsequently, being led to examine the small inlet or arm of the sea where I observed these cliffs, I could feel under water, at low tide, by means of a pick, the slate forming the entire bottom; but owing to much mud and seaweed having collected above it, I could not ascertain whether any coal deposits actually existed on this spot. At one place only in this inlet are the slate strata visible; and they here appear dispersed in the most jumbled and promiscuous order, a number of slips and falls disturbing the regularity of the layers, which nevertheless still present a smooth surface, forming the bed of the inlet. The fact that the basalt occurs in the neighbourhood of the coal formation of this locality, in no way militates against the existence of the latter, as I am able to allude to many places where it not only overlaps, but actually breaks its course through the coal strata, without much injury to the coal. (On this subject, see Sir R. I. Murchison's *Siluria*, chap. xi., page 273; also his *Silurian System*, page 113.)

This formation, which runs east and west, dips southward towards the granite of Cape Wollomai, and the basalt of the south coast of the island. The apparent paradox can be explained only by an investigation requiring a much greater amount of time and labour than I can justifiably apply for the purpose.

On the point referred to at Phillip Island, the coal formation is exposed to view, and to minute examination, to a thickness of more than 400 feet. It requires a practical mining surveyor to ascertain the best spot (towards the south) where a boring is likely to be successful, in order to ascertain the character of the strata above that mentioned at the inlet, the depth of strata to which our knowledge would then extend, being limited by the dip at which it is inclined.

A second boring on Sandy Island would give the inter-

mediate strata between the lower ones of French Island, and those observed by me at the place before mentioned.

This latter boring, I am inclined to think, would be successful in obtaining coal; but as the uppermost strata of the formation at that point are submerged beneath the waters of Western Port on the one side, and the inlet on the other, and thus separated from those islands, it is questionable whether, in the event of such discovery, it could be worked remuneratively at the present rates of labour, as the difficulties to be overcome in regaining the surface from the sea, are such as could only be met by the appliances brought to bear in Europe.

However, were it even only for the purpose of scientific information, and for the sake of gaining experience in further researches for coal fields, it is of importance that two such borings should be undertaken, as they would reveal to the geologist all the intermediate strata to the depth of upwards of three miles—an opportunity which certainly ought not to be neglected.

On consideration of the facts enumerated in this report, I am decidedly of opinion that some search should be instituted, and boring commenced, for the discovery of workable coal seams at those several spots, namely, on Phillip Island, French Island, and Mrs. King's station.

The district named would form a much more preferable harbour for shipping than that of Cape Paterson mines, and a large revenue by the sale of lands might be expected to accrue from so valuable and important a discovery, especially as the soil, though of a sandy appearance, is in general of excellent quality for agricultural purposes.

The granite of Cape Wollomai is quite peculiar to that locality, and forms picturesque pyramidal peaks, on and around the tops of which are seen numbers of large sea hawks (ospreys) and gulls. This fine-grained granite is characteristic, on account of the intense green colour of the mica, and the livid flesh colour of the felspar. This may be the origin of the local reports concerning copper, which is believed to exist in this district. Between this granite a layer of quartz rock winds its course along the foot of the hill. At the same time is also observed a highly interesting fact, namely, the junction of the volcanic and plutonic rocks, where the basalt comes into contact with the granite.

The basalt formation is most extensively and magnificently represented on Phillip Island, every variety occurring in

great abundance. No locality in Victoria offers to the student a wider field for examination, in the study of the basalt formation, than this island. I will here briefly point out the several characteristics to be observed there:—

1. Dense black basalt.
2. Dense basalt occurs in platforms and columns.
3. Porous basalt, becoming perfectly amygdaloidal calspar, amalcine, arragonite, mesotype, and zeolites, embedded in it in large cavities. Point Grant.
4. Basaltic caverns of considerable extent may also be observed.
5. Intensive light chocolate coloured basalt, of a soft nature, in some places assuming the character of fuller's earth, closely allied to the basalt conglomerate.
6. Basalt conglomerate, of black colour, the pieces never exceeding the size of a man's hand.
7. Conglomerate of chocolate colour, of a similar nature with Nos. 5 and 6.
8. Columnar basalt, very regular pentagonal columns: the interior consists of dolerite.
9. Dolerite or greenstone.
10. Decomposed dolerite, of a greenish colour, with light spots, appears like clay.
11. Dolerite, blending with basalt, rapidly, yet so gradually, that no boundary is distinguishable (*vide* No. 8).
12. Decomposed basalt, chocolate colour, forming the rich alluvial soil.
13. Veins of a slaty-clay nature, of considerable size, and yellow ochreous colour, creeping through the basalt columns for a considerable distance (about a quarter of a mile.)
14. Concave basins in basalt conglomerate (*vide* No. 7), one chain in diameter, deep brown or red colour.

The little island situated between Settlement Point and French Island, consists entirely of basalt. Its surface is only about three or four feet above the level of the sea. It is the breeding place of multitudes of sea birds.

The total absence in Phillip Island of slate of older formation than the carboniferous strata, is rather remarkable, as at the distance of a few miles the plutonic and neptunic rocks appear to be separated by the volcanic agency, and no other neptunic rocks are visible, besides the slate and sandstone of the carboniferous era.

On the southern coast of the island, I found washed up by

the sea, boulders of flint, of precisely the same nature as that occurring in the chalk formations of Europe.

On the south-west point I likewise obtained some very beautiful analcime crystals. From analysis I find the composition of these crystals to be—Silica, 55; alumina, 23; soda, 14; water, 8.

Along with this new Victorian mineral I also found mesotype: its constituent parts are—Silica, 49; alumina, 27; soda, 17; water, 9; and iron oxide, 1.

Between Phillip and Churchhill Islands occurs a quantity of chalcedony, washed up on the beach by the sea. This beautiful material might easily be made available for ornamental purposes.

On the eastern side of French Island, two quarries of excellent flagstones for pavements could with little difficulty be opened, since, as elsewhere mentioned, numerous vessels constantly run between Melbourne and that locality. A profitable investment for labour is here offered.

Quarries of good flagstones, of a peculiar quartz nature, and of great extent, could, I am persuaded, be opened at Cape Wollomai (Phillip Island); and, in connection with this subject, I may here express my opinion that this point is exceedingly well adapted for the establishment of a prison. Springs of excellent water are abundant on the very summit of Cape Wollomai, and in the surrounding neighbourhood, and ships can easily approach in the eastern passage to within a very short distance of the point in question, either for the purpose of obtaining cargoes of flags, or for the furnishing of supplies. A very small guard would serve for the protection of such a settlement, as both the insulated position and physical character of the country offer no chance of escape for the prisoners. The coast around the site which I suggest, is composed of fine-grained granite; and as I am convinced that no better situation for the purpose named could readily be discovered, I briefly recommend this proposal to the notice of the Government.

About one half-mile from the coal formation elsewhere described, is a site strikingly adapted for the establishment of a naval dockyard, and which has already been used for vessels of upwards of 100 tons. In the immediate neighbourhood, scarcely one hundred yards distance, are numerous clusters of box trees, whose crooked shapes render them well fitted for the construction of knees for ships. Abundance of fresh

water, entirely free from salt, can be obtained by digging in the sand about one chain from the beach, to the depth of about six feet.

At intervals about half a mile apart, on Phillip Island, may be observed curious conical structures, generally around an old stump.

Through this rotten stem the ants penetrate, making congeries of cellular passages, remarkable for their beautiful diversity. To secure their newly-found dwelling-place, the industrious little insects heap up a mass of firm clay around the stump, and which in time also becomes perforated with streets. This clay is from six to twelve inches in thickness, and the whole pile or cone is from five to seven feet in height. The ants themselves are very small, being scarcely 2-8ths of an inch in length.

A great variety of sponges are found in certain spots on the shores of Western Port Bay, but chiefly on the southern coasts; and although the present is a bad time of the year for obtaining them, I have nevertheless collected a considerable number, and about a hundred different varieties. The winter is the most favourable period for this purpose, as the tempestuous sea then detaches large numbers of them from the rocks on the bed of the ocean, and casts them on the beach, where many very fine living specimens may then be obtained.

Sponges of the finest quality for washing, and other useful and commercial purposes, as also coarse ones, well adapted to the cleaning of horses, vehicles, &c., can be obtained in abundance during the winter season on the shores of the whole southern coast.

Mollusca are by no means very plentiful along our coasts, and though I have for this reason been unable to obtain many specimens of the living animal, I have, notwithstanding, collected some hundreds of their shells. It is impossible to obtain a good collection of specimens in this branch of natural history without having a complete apparatus for the purpose, or, what is more feasible, employing an oyster dredger; and as my means are inadequate to justify an outlay for such a purpose, I am compelled to postpone a collection till more time and funds are at my command, for the fulfilment of such an object.

Oysters are abundant in Western Port; but during the months of January and February are of rather an inferior quality, these months being the spawning season.

The deep channels intersecting the mud flats or banks of the bay, contain a considerable number of curious shells; among these are different species of *terebratula*, nearly allied to *globosa*, and which, in the old world, are of rare occurrence, being found only on certain parts of the coast of Sicily. In many parts of Europe, however, fossil species are very common; nevertheless, the living varieties are found only in Sicily, Australia, and New Zealand; and inhabit only the deeper parts of the ocean, being seldom obtained at less than six, or in more than sixteen, fathoms depth.

The family of *patellidae* are very numerous along the whole of the Victorian coasts, and a great number of different species, some of them of considerable beauty, are to be met with.

The *emarginula Australis*, quite peculiar to the southern coasts of Australia, I found in considerable numbers on the shores of Phillip Island, although I was unable to succeed in obtaining any specimens of the living animal.

To the family of the *chitonidae*, belong but few species inhabiting our coasts. I have, during my excursion, found only two varieties; but there may be many others which escape my observation, as I am much too busily engaged, and my time is far too short, to pay any considerable attention to the conchology of the country. Engaged in pursuits of a more practical and important nature than that just mentioned, I am with reluctance compelled to defer any further investigation relative to this highly instructive and interesting branch of science. Concerning ichthyology, I have to make the same statement, as it is quite impossible for me to attend to so many different subjects at once.

Having been assured by some of the neighbouring settlers that I should be well repaid by a visit to Phillip Island, in obtaining many specimens of snakes, I must state that I was much disappointed in this object, as during my stay here, I observed neither snakes nor remarkable lizards of any kind; only a few common in all parts of the country.

Birds.—I chose the coast for my excursion at this season, partly for the purpose of observing the habits, &c., of the sea birds, the period of incubation having just passed over.

The young of the penguin (635, *Spheniscus minor*, little penguin,) and (636, *Spheniscus undina*, fairy penguin,) have nearly arrived at maturity, about the middle of January. Some few of these birds, however, do not begin to lay their

eggs until the latter end of that month. When caught alive the penguin defends itself with great courage, never making any attempt to escape danger: this, however, is chiefly attributable to the awkwardness with which it walks on land, the wings being required to support the body, and so used like legs. Hence its pugnacity is the only source upon which it can rely for its protection.

The nests of the penguin are very numerous in certain places along the southern coasts of Phillip Island, and consist of hollows burrowed in the sandy soil beneath some thick bush or scrub. It lays only two eggs at a time. The penguin is amongst the fattest of all the Australian sea birds; and this circumstance causes it to be very troublesome to skin, much time being occupied, and plaster of Paris consumed in freeing the skin from the fat which adheres firmly to it, and a large quantity of preserving matter being subsequently required to protect it from the attacks of insects.

The short tailed petrel (606, *Puffinis brevicaudus*), or mutton bird of the colonists, does not form its nest at the bottom of the cliffs or sandy banks like the penguin, but prefers the harder sand above them. Both birds, however, select the same spots or parts of the shore, with the characteristic difference in their choice just mentioned. The nest of the petrel is formed on the open ground, quite unprotected by bushes, and slopes gradually down, to allow of the easy ingress and egress of the bird. It is much deeper than that of the penguin, the slope being sometimes five or six feet in length.

The eggs of the great petrel are of excellent quality, and during the month of December could be collected in cart loads at certain places at Western Port. Those of the penguin are not edible, as they possess a peculiar fishy and disagreeable taste, the yolk and white, moreover, being compounded.

These birds rise at the first dawn of light, and directly repair to sea in quest of food. They do not return till a considerable time after sunset, when darkness has completely set in; and during their prolonged absence, traverse the ocean wastes at a distance often upwards of one hundred miles from land.

January is the breeding month of these birds.

The petrel chooses the higher ground for facility of flight, and the penguin selects the lower position, that it may not have so great a distance to walk.

Three different varieties of hooded dottrell are found on the shores of the southern coast (472, *Hialicuta biancta*, double banded dottrell), (474, *Hialicuta manacha*, hooded dottrell,) (476, *Hialicuta nigrifrons*, black fronted dottrell.) These birds run extremely fast on the sand, making about six steps during the time a man would make one; they will for miles keep at equal distance from him without attempting to fly. They are usually found in groups of five or six, and seldom exceed the latter number.

Now and then two different species of rook's crane (one a snow white) (517, *Herodias gregii*), the other of a darkish bluish grey colour (516, *Herodias jugularis*,) blue reef heron, are observed on the coast. The common crane is also found in large numbers; but is very cautious, and consequently difficult to obtain; which remark applies indeed to nearly all the birds of this locality. Both the white and grey rook crane mentioned above, fly singly, and are rare birds.

A very similar species of sea swallow (570, *Hydrochelidon fluviatilis*) to that which exists in Europe, also frequents our shores.

It differs from the European variety only in size, being considerably larger than that known in England as the common tern. It flies at a considerable height above the sea, and at a very rapid rate, its powerful bill being pointed perpendicularly downwards towards the sea, in order that it may the more readily seize on any unwary fish which may make its appearance on the surface. The ferocious and demoniacal appearance of its eye, together with its long and sharp pointed bill, of an intense red colour, invests this bird with a truly formidable aspect. The moment it obtains a glimpse of its prey, it throws its body vertically over its bill, and thus, with its sharp form cutting the air, drops with the rapidity of lightning, and often from a very considerable height, seldom less than 100 feet, on its unsuspecting victim. The amazing velocity with which this is effected is such, that the observer has scarcely time to divine the cause of the sudden movement, and it is not before observing attentively several such precipitations, that the impression which it leaves on the eye is correctly understood.

Its prey being secured, the bird immediately rises again to the same altitude as before, and continues its flight, its fierce eye scanning the sea in quest of new victims.

The proportion between the length of the body (*i. e.*, from tip to tip, including the bill,) and of the wings (from tip to

tip, including the breadth of the body,) of all the aquatic birds of Victoria exists in its greatest extremes, as far as my experience goes, in the sea swallow and the penguin.

The proportions are expressed by the ratios 1. 2. 27. and 1. 0. 81. (standing respectively for the order in which they are named; the antecedent unit representing the length of the body.)

The courage with which the sea-swallow defends itself and young, and the cautiousness it displays at the same time, are truly astonishing. Not less marked courage does it exhibit when attacked by the osprey and white breasted falcon, as it almost invariably repels their onslaughts, and forces them to an ignominious retreat. The cry of the sea-swallow very closely resembles that of the gang gang cockatoo, and I have not unfrequently mistaken it for the last named bird. Their breeding places are on the small islands, in company with the pelican, the gulls, the oyster-catcher, and curlews, &c., which appear all united in the same social bond.

Three different varieties of gulls are very plentiful along the southern coast, in the more secluded bays. The great black backed gull (557, *Larus pacificus*, Pacific gull,) associates in pairs, being seldom seen singly, and generally cruises in the neighbourhood of its nest. It defends its young in the most affectionate manner, and even when the young one is taken, will refuse to leave the neighbourhood of the captor. Their companions also partake of their melancholy solicitude, and remaining close to the spot, may be shot and secured one after the other. The continual cry "on on" is well known to the seamen along the coast. They evince great courage in defending themselves from the ferocious assaults of the osprey and white breasted falcon.

The large grey gull is seldom seen, and only in groups of two or four. This species is much more timid in the defence of its young than the last mentioned variety.

The little white gull (558, *Hema Jamesonii*, Jameson's gull,) although numerous, is extremely cautious, and is, on this account, with difficulty obtained.

Two varieties of oyster catchers are observable on our coast. These birds generally associate in groups varying from two to five. The first species is completely black (464, *Haemotopus fuliginosus*, sooty oyster catcher;) the other is chequered white and black (463, *Haemotopus longirostris*, white breasted oyster catcher,) and is precisely similar to our European species.

The pelican (625, *Pelecanus conspicillatus*) is found in great abundance in Western Port. During low tide these birds are seen on the mud flats at gunshot distances apart, wading about at the edge of the water in search of prey. At high tide they retire to the small islands which form their breeding places, and there digest their rich food, and attend to their young.

They can be seen at the distance of twelve or fourteen miles, and then appear like a small boat or white rock. The nest consists of a few sticks on the open places between the bushes. In these the young ones, which during the first month are perfectly naked, gather promiscuously together in groups of ten or fifteen, while the parents are in search of food.

The pelican lays only two eggs, which are perfectly white, of a considerable size, and of an elongated spheroidal or conical shape, both ends being exactly similar.

The weight of this bird averages about fifteen pounds, exclusive of food found in its pouch, sometimes two or three pounds in weight.

This food consists of small fishes, eels, &c., and is retained in the pouch affixed to the bill, for the purpose of carrying it to the young. I am inclined to think that instead of catching each fish individually, the pelican dips his long bill into the mud, and filling his capacious pouch, washes the mud and shells away. Thus freed from sandy or muddy particles, the fish remaining are either retained in the pouch for the purpose above-named, or are taken into the stomach. The stomach itself consists of a large pouch, containing a large number of glands.

The timidity of the pelican is striking, especially when compared to the courage displayed by the smaller birds around him. At the least danger he leaves his nest, and, if alarmed, will not return for at least two days, as I have watched during that time both day and night, for the purpose of observing their habits, &c., in the scrub of a small island, scarcely one acre in extent, on which they were plentiful. The black backed gull, in the absence of the pelican, generally defends the nest and young of the latter against the fierce assaults of the raptatores.

The Cape Barren goose (539, *Cereopsis Novae Hollandiae*), although extremely scarce in these districts, is, nevertheless, sometimes observed upon the insulated rocks along the south coast of Phillip Island.

The black swan (544, *Cygnus atratus*) is very plentiful in Western Port and the fresh water lagoons of the southern coast. When exercising their young, the female cautiously leads the way, followed by the young ones, and if any of the latter are seen to loiter, they are sharply reproved by the old male bird, who follows behind. If the female takes alarm, she turns quickly back, but the male, while unaware of the danger, compels her to resume her place. The moment, however, that he himself becomes acquainted with the cause of alarm, he immediately turns back, and swims with great rapidity from the seat of danger. At this juncture the female appears either stupified with fear, or in anxiety for her young brood: she waits to discover the actual danger, as she generally remains behind, and becomes a victim to the aim of the bushman.

In the beginning of February, which is the month in which the black swan moults, the old birds lose their wing feathers, and for this reason remain almost continually in the water. At this time, too, the young have fully arrived at maturity, although they are not yet capable of extended flight, and still require the protection of their parents.

Western Port is visited by large numbers of shags (617, *Phalacrocorax subeirostris*, groove-billed cormorant, and 620, *Phalacrocorax melanoleucus*, pied cormorant), of which only two different species have come to my knowledge.

They are very expert at diving, and remain a long time under water. I have myself counted to 130 many times over during the stay of a shag below water, which appears about the limit of his stay under water.

At low tide the extensive mud flats which then appear above the waters of Western Port Bay are covered with birds of every description mentioned above, and present such a novel appearance as to suggest the idea of the original state of the animal tribes within the plains of Paradise.

Those extremely shy birds, the curlews (498, *Numenius Australis*), are very plentiful along the southern coasts, but are so difficult to obtain that, unless a brush fence be erected, it is quite impossible to get a shot at them, and even then extreme caution is required in order to succeed.

The family of *falconidae* is very numerously represented in this part of Victoria.

Six different varieties of hawks and falcons inhabit the islands of Western Port Bay, but as they are very cautious, and give but few opportunities for observation, I am unable

to state much concerning them, but must wait till more experience gives me a further knowledge respecting them.

The white-breasted falcon (7, *Falco hypoleucus*) and the osprey (6, *Pandiclin leucocephalus*), although numerous, are very difficult to obtain, owing to the quickness of their sight and extreme cunning.

I have obtained two different species of owls (31, *Strix delicatulus*, delicate owl,) and (32, *Athene Boobook*, Boobook owl) on Phillip Island.

At Mrs. King's station I found two varieties of water hens.

On the 25th of January my camp, on the north side of Phillip Island, was visited by large flights of the great swift, (50, *Cypselus Australis*), which did not wholly disappear till late on the ensuing morning.

In this report I have not brought forward the several notes and observations I have made on the birds, &c., which have come under my knowledge. The substance of these relates to,—

1. The food.
2. The tongue.
3. The stomach.
4. The colour of eyes, bill, and feet.
5. The weight.
6. The relative sizes and lengths from tip to tip.
7. The number of feathers in 1st, 2nd and 3rd order, and scientific description of the plumage directly after the specimen is shot.

These notes will no doubt become valuable to the public after the lapse of a few years; but I have not brought them forward in my reports, since much further experience concerning each specimen is required to ensure the correctness desirable in the position which I have the honour to occupy.

The information I received from different parties respecting the ease with which seals could be obtained on Phillip Island is incorrect, as from experience I am now able to state that, although seals exist on the islands and insulated rocks on the southern coast, it is impossible to approach them without an experienced crew and a good boat, on account of the rocky and precipitous nature of their retreat, and the heavy surf continually rolling in from the great Southern Ocean.

The hoarse groaning roar of the seal can be heard at a great distance, and to the person engaged in hunting them is

not a little exciting, especially when the want of the means of approach precludes him from attacking them.

In January the seal is already accompanied by young ones.

The water rat exists in the lagoons on Phillip Island in considerable numbers, but appears to me to be much smaller than the species of the main land. In January I observed five foetuses from the womb of a female.

The brush tailed or white tipped wallaby exists in great numbers on Phillip Island, particularly on the eastern side, but in the last-named direction it appears to be of a lighter grey colour than that on the western portion of the island.

The wallaby frequents the low scrub and fern, and retreats for safety in the dense tea-tree scrub in the moist places.

It is not unfrequently, however, found grazing in the more open grassy plains.

When alarmed it raises its head, which is alone seen over the fern, and gazes stupidly at the approaching sportsman, who in such circumstances obtains an easy shot. In the more open places, however, the animal better appreciates the danger, and speedily disappears at the least approach of the sportsman. Towards evening they come out of the forest, and are frequently observed wading about at the edge of the sea, especially near the mangrove trees growing in the water. I have made this observation, and so often watched their actions while in the water, that I think it probable that the animal occasionally drinks salt water.

The hind quarters of this animal are much esteemed by the inhabitants of the bush, and possess a taste not unlike hare.

The male wallaby is the most vigilant, the female being invariably the last to take alarm.

The pouch of the virgin animal is remarkably small in comparison to those which have already produced young ones.

The stupidity of the wallaby, especially the female, is so great while feeding that I have shot a male and female successively, while the latter was grazing along with him, and did not offer to stir, but still continued grazing after her companion was killed beside her.

It is a very remarkable fact that the wallaby is the only species of *Marsupialia* which exists on Phillip Island. What is still more remarkable, the shores of the mainland opposite this island swarm with multitudes of hungry wild dingos,

and yet, although a very narrow passage divides the two shores, no wild dogs are found on this island.

The other islands of Western Port do not even possess the wallaby. The simplest way to account for the existence of this animal on Phillip Island is to suppose that an extensive bush fire, travelling westward, drove them over from the mainland. As before mentioned, only a very narrow passage (in one place scarcely more than two chains in breadth) separates the island from the mainland. However, if it be admitted that the wallabies have swum across, there is no reason why the dingos and other animals should not have done the same. At any rate the very circumstances exhibit several extremely remarkable facts, especially with reference to those other islands, which are completely destitute of all the Australian quadrupeds.

The skins of the wallaby and kangaroo are useful for the purposes of the currier, and of considerable value on that account, being sold at 16s. per lb. Both these animals abound in such large numbers in the Western Port district as to be a perfect annoyance to the settlers of those parts, and, under these circumstances, I think the collecting of skins offers a remunerative source of employment to a considerable number of men.

The skin of the kangaroo, while in an unprepared state, weighs from twelve to fourteen pounds, after being submitted to the process of tanning, from eight to ten pounds, which facts, I conceive, fully bear out the correctness of my remark. Eighty or ninety pounds of saleable meat is often obtainable from a single specimen, and as, moreover, a number of "Joeys," or young ones, for which captains of vessels proceeding to Europe pay handsome sums, are frequently caught with the old ones, it would not require great intelligence, or even labour, to obtain a good living by the means above stated, especially as there are a considerable number of vessels communicating between Melbourne and Western Port.

As before mentioned, the wallaby is found scattered over the whole of Phillip Island, but is especially numerous on the eastern portion.

This preponderance eastward seems but a miniature representation of that great law of nature observed on the older continents, viz.,—That while the animal world becomes more developed and increases in actual numbers westward,

to the east all appear to diminish and disappear in the lists of species. The rule applies as well to Australia as to the continents of the old world, but is marked with this striking difference, viz., that the order of progression is here reversed, animal life increasing eastward and diminishing westward. It is far from improbable that the sun exerts some secret influence in thus drawing animal life eastward, as after a cool night the animals would naturally choose that direction approaching the sun to warm themselves in his rays, and in this manner continually creep eastward. This conjecture does not apply to the older continents, as there the warm winds proceeding from the westward counterbalance the heat derived from the genial rays of the sun. Civilization, too, in the older continents travels eastward, while in the Austral hemisphere the order is again, singularly enough, reversed; here we may flatter ourselves that it creeps westward. Thus it appears to gain ground precisely as the animal development becomes less, in other words, where the resistance to it diminishes.

ART. VIII.—*Irrigation.* By F. C. CHRISTY, Esq.

IRRIGATION being a branch of engineering much overlooked in this colony where it would be of the very greatest possible service if properly and judiciously introduced, I have taken upon myself to write a few lines upon the subject, not so much with a view of submitting plans, or of affording any great amount of information upon the subject, as to elicit from others who have had more experience than myself, the method adopted in other countries; for my knowledge is confined to the flooding of water meadows in England. I have also had very little opportunity of seeing the colony of Victoria generally, but the little I have seen, has struck me with the vast importance of irrigation. On the Geelong side there are very extensive plains, which are of the richest soil (basaltic). These plains being exposed to the full effects of the sun's rays, become parched up in summer, so that there is neither pasturage for sheep nor cattle, neither can they be tilled to any advantage. The grass which grows upon them in winter becomes parched, dried, and bleached, almost to whiteness, consequently the reflection from the sun is so great, that it is dangerous to be exposed on them during